

## THE GENUS *CARYA* IN MEXICO

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FIVE SPECIES OF *Carya* have been reported from Mexico, *C. illinoensis* (Wang.) K. Koch, *C. myristicaeformis* (Michx. f.) Nutt., *C. mexicana* Engelm., *C. tetraptera* Liebm., and *C. Diguetii* Dode. The distribution of the first three is given in Standley, *Trees and Shrubs of Mexico* (Contrib. U. S. Nat. Herb. 23: 165-167. 1920), Martinez, *Las Plantas mas utiles que existen en la republica mexicana* (pp. 295-297. 1928), and Martinez, *Catalogo de nombres vulgares y cientificos de plantas mexicanas* (pp. 330-333. 1937). In the last article the distribution is given under the alphabetically arranged common names such as *nogal*, *nogalillo*, *nuez*.

Various collectors during the past twenty years have added information concerning the distribution of the species. Studies by the writer on the types of the last two species mentioned above indicate these to be synonyms of the first species. One species has been reduced to varietal rank and one new species related to *C. cordiformis* has been proposed.

The writer wishes to thank the curators of the various herbaria for their generosity in lending specimens; especially Dr. O. Hagerup, Botanisk Museum, Copenhagen, Dr. H. Humbert, Museum d'Histoire Naturelle, Botanique, Paris, and Dr. R. Llamas, Instituto de Biologia, Chapultepec, Mexico.

Following is a key to the Mexican species of *Carya*:

1. Leaflets 5, each serration with a dense tuft of hairs on one or both sides of its apex; bud-scales brown, imbricated; fruit not winged at the sutures, the husk rather thick.....4. *C. ovata* var. *mexicana*.
1. Leaflets 7-15, the serrations glabrous or ciliate but without special dense subapical tufts of hairs; bud-scales valvate; fruit winged at the sutures at least above, the husk thin..... 2
  2. Buds bright yellow; leaflets strongly to densely glandular-lepidote beneath, the glands yellow; all leaflets sessile; nut slightly flattened, not mottled, 4-celled in lower half, thin-shelled; seed probably bitter, the endosperm ruminating.....3. *C. Palmeri*.
  2. Buds grayish-hairy (over yellow) or brownish; leaflets either remotely lepidote or densely grayish- or brownish-lepidote beneath; leaflets sessile or stalked; nut terete, mottled, 2-celled, or if 4-celled only at extreme base; seed sweet, the endosperm not ruminating.. 3
    3. Buds and often twigs very densely grayish- or brownish-lepidote, essentially glabrous; leaflets not falcate, usually sessile, very densely grayish- or brownish-lepidote beneath, usually appearing lustrous or silvery white; bud-scale scars crowded, forming a narrow ring; nut very thick-shelled, without lacunae in the septa; common peduncles of the staminate catkin clusters well developed, at the base of the terminal leafy growth only....  
.....2. *C. myristicaeformis*.

3. Terminal buds hairy, the lateral brown with scattered yellowish glands, glabrous or hairy; leaflets remotely yellow-lepidote beneath, not lustrous, often strongly falcate, the terminal and often the lateral stalked; bud-scale scars high, the pairs separate, not forming a ring; nut mostly thin-shelled, with lacunae in the primary septa and in the secondary internal ribs; peduncles of the staminate catkin clusters very short, at base of terminal leafy shoots and also on special leafless shoots from old wood. . . . .1. *C. illinoensis*.

A list of collections is recorded for each species in order to validate the distribution. Also recorded are the herbaria wherein the specimen may be found. When the material is sterile no symbol is given. Whenever staminate flowers, pistillate flowers, immature fruit, or mature fruit as well as leaves are present, indication is made by the abbreviations *stam.*, *pist.*, *im. fr.*, or *fr.* respectively; *fr. only* indicates that no leaves are present. The following are the herbaria and their abbreviations as used in this paper: AA = Arnold Arboretum; CM = Chicago Natural History Museum; BPI = Bureau of Plant Industry, U. S. D. A.; GH = Gray Herbarium; MO = Missouri Botanical Garden; Mich = University of Michigan; NY = New York Botanical Garden; Tenn = University of Tennessee; Tex = University of Texas; US = U. S. National Herbarium; USFS = U. S. Forest Service; WEM = the writer's personal herbarium; Cop = Botanisk Museum, Copenhagen, Denmark; Mex = Instituto de Biologia, Chapultepec, Mexico; Paris = Museum d'Histoire Naturelle, Botanique, Paris, France.

1. *Carya illinoensis* (Wang.) K. Koch, Dendr. 1: 593. 1869.

*Carya pecan* (Marsh.) Engl. & Graebn., Notizbl. Bot. Gard. Mus. Berlin, App. 9: 19. 1902.

*Carya tetraptera* Liebmann, Vidensk. Meddel. Naturh. For. Kjøbenhavn. 1850: 80. 1850.

*Carya Diquetii* Dode, Bull. Soc. Bot. France 55: 470. 1908.\*

Large tree; leaflets 9–17, the lateral ones sessile or short-stalked, acute at the base, typically narrow, oblong-lanceolate, falcate, but sometimes broader, ovate, not falcate; terminal leaflet stalked; twigs, rachises, and lower leaflet surfaces glabrate to densely puberulent; bud-scales valvate; terminal bud grayish yellow-hairy, the lateral buds brown, glabrate or occasionally pubescent, with few to many yellow glands, the bud-scales frequently broken off and exposing the densely silky-pubescent inner leaves; bud-scale scars broad, the pairs separated, not forming a ring; clusters of staminate catkins subsessile or short-stalked (stalk usually 1–3 mm. long), located at the base of an elongate leafy new growth and also in pairs at the base of special short leafless branches from old wood; fruit brown, elliptical to oval, mostly 4-winged and -angled to the base; nut elliptical to oval, cylindrical, not angled or very slightly so above,

\* See Little, Amer. Midl. Nat. 29: 501. 1943 for other synonyms and discussion of name.

brown, mottled with irregular darker brown markings; husk and nut-shell thin; true secondary (dorsal) septa essentially absent, the short projections from the primary wall not usually reaching the outer wall of the nut, the nut 2-celled in the lower half or somewhat 4-celled at the extreme base; primary septa and internal secondary ribs (ridges) with lacunae, the lacunae of the latter not clearly covered with a hard wall.

VERNACULAR NAMES: *La nuez chiquita*; *nogal liso*; *liso o encarcelado*; *nogal morado*; *nuez encarcelado*; *nogal de Cuilpan*; *nogalito*; *pecan*.

NUEVO LEON: Monterrey, *C. K. Dodge* 19 stam. (GH, US); *C. H. & M. T. Muller* 65 fr. (AA, CM, Tex, Mex); *C. R. Orcutt* 1076 fr. (US); *C. S. Sargent* in 1900 (*Canby* 222) stam. (AA, US). — Monterrey, Sierra de la Silla, alt. 1700 ft., *C. G. Pringle* 11177 fr. (CM, GH, MO, NY, US, Mex). — Monterrey, Reniate, *G. Arsène* 6164 (*Abbon* 179) fr. (AA, GH, MO, US). — Galeana, along bank of stream, alt. 5400 ft., *V. H. Chase* 7737 im. fr. (BPI, CM, GH, MO, NY). TAMAULIPAS: San Jose, Sierra de San Carlos, *H. H. Bartlett* 10394 fr. (US). — La Morita, Marmolejo, *H. H. Bartlett* 10738 fr. (US). — South Victoria, La Jolla Ranch, *R. Runyan* 1011 stam., pist. (AA, Tex, US); *R. Runyan & B. C. Tharp* 4070 stam., pist. (Tex). — Jaumave, *H. W. Viereck* 302 (US); *L. H. Dewey* 3/31/1903 (MO). — Circa les minas de Victoria a Tula, *J. L. Berlandier* 855-2275 (GH). SAN LUIS POTOSI: Tamazunchale, *M. T. Edwards* 937\* (CM, MO, Tex). — Alvarez, *C. C. Parry & E. Palmer* 835 ½ *pro parte*, fr. (GH, MO, US). JALISCO: Zapotlan, *B. P. Reko* 4672 stam. (US). HIDALGO: Ixmiquilpan, *J. N. Rose, J. H. Painter & J. S. Rose* 8945 fr. (CM, NY, US). — Tecozantla, *F. Salazar* in 1913, fr. (US, Mex). GUANAJUATA: Moist soil in stream-bottom canyon, 5 km. west of Xichu, alt. 1600 m., *E. L. Little Jr.* 11074 fr. (USFS, WEM). — Pamillas, Rio Pamillas, 25 km. northeast of San Luis de la Paz, moist soil in canyon bottom, alt. 1740 m., *E. L. Little Jr.* 11090 fr. broadly winged (USFS, WEM); same general locality, *E. L. Little Jr.* 11091 fr. essentially wingless (USFS, WEM), and *E. L. Little Jr.* 11092 fr. narrowly winged (USFS, WEM). COAHUILA: Muzquiz, *E. Marsh* 6 pist. (Tex). — Monclova, alt. 2000 ft., *S. S. White* 1702 (Mich). OAXACA: Oaxaca, at foot of Cerro de San Felipe, open pasture-like area, *A. J. Sharp* 45915 (Tenn, WEM). — Oaxaca, Monte Alban, *J. N. Rose & W. Hough* 4657 fr. (US). — Cuilapa, *F. Liebmann* 3777 im. fr., old pist. (Cop, CM). — MORELOS?: (marked "Morelia: Parco"): *Arsène* 1/1910 (CM). MEXICO: "Mexique, region de Mexico," *M. L. Diguet* in 1908, fr. (Cop, Paris).

This species was reported by both Standley (1920) and Martinez (1928, 1937) as growing in Nuevo Leon, San Luis Potosi, and Hidalgo. Both authors indicate also possible distribution in Oaxaca, apparently referring to the uncertainty of the identification of the collections of Liebmann. In addition to the above states, the species is now definitely known from Tamaulipas, Jalisco, Guanajuata, Coahuila, Oaxaca, and possibly from Morelos and Mexico D. F. I. M. Johnston (*Jour. Arnold Arb.* 25: 435. 1944) writes as follows about its presence in Coahuila: "Reported as growing wild in northeastern Coahuila along the bottomlands of the Rio San Diego, Rio Rodrigo, and Rio Sabinas, by Pablo

\* Specimen incomplete, hence identification uncertain; it might be *Carya Palmeri*.

Frick, Mexico Forestal 1: 11–14, fig. (1923), and by Angel Roldan, Mexico Forestal 3: 30–32, fig. (1923). I have been told of pecan-trees which formerly grew about Muzquiz and Nacimiento. I have seen no specimens from Coahuila. However, the species is to be expected in northeastern Coahuila, for pecans have been collected in Val Verde (Devils River) and Uvalde Counties in adjoining Texas." The pecan also grows wild in southeastern United States.

The natural distribution in Mexico is somewhat uncertain, as the trees have definitely been introduced in some areas (see Martinez 1928), and few herbarium labels have clear notes on habitats. On *Liebmann 3777* it is recorded that the trees grow wild on hillsides, and on *Runyan 1011* it is indicated that the trees are abundant on the sides of mountains in Tamaulipas. On the other hand, the field notes on Dewey's specimen indicate that the many large trees at Jaumave, Tamaulipas, have been introduced from Texas. It is evident that much of the range indicated above is a natural one, with part of the range represented by cultivated trees only, and in other areas by a mixture of native and cultivated trees.

The writer has seen the types of both *Carya tetraptera* Liebm. and *C. Diguetii* Dode. The type of the former, *Liebmann 3777* (with four sheets collected at different times) consists of essentially glabrous specimens of typical pecan with 9–11 (7–13?) narrow stalked leaflets. The immature, strongly 4-winged fruits and the nearly mature fruit indicate that the fruit and nut are elongate, essentially elliptical or oval. The sterile isotype at the Chicago Museum of Natural History has hairy, broader, less falcate leaflets characteristic of certain trees of *C. illinoensis*. Dode (1908) described *C. Diguetii* as belonging to the section EUCARYA and related to *C. texana* DC., having 6–10 sessile leaflets, and the staminate catkins on new wood. (Little, Amer. Midl. Nat. 29: 502. 1943, has pointed out that the name *C. texana* has been used for two or possibly three different species, in two different sections; the photograph of the type of *C. texana* DC. from Geneva seen by the writer merely shows that the 9–13 leaflets are very hairy and does not indicate the section to which it belongs, but the number of leaflets suggests APOCARYA.) However, the type specimen, collected by Diguet in 1908 (poorly pressed by the collector), belongs to the section APOCARYA. Some of the staminate catkins are clearly on special short branches from the old wood, the bud-scales are valvate, and there are lacunae in the primary septa and in the secondary internal ribs of the nut. The nut, although small (19–21 mm. long and 13–15 mm. in diameter) and somewhat oval-cylindrical, is a typical pecan both externally and internally. The nuts from Copenhagen examined by the writer were so darkened by oil and age that darker markings could not be observed. *Pringle 10167* (cited by Dode as *C. Pringle*, Sierra Madre above Monterrey, Mexique, 2500–3000 ft., 1906, distributed without fruit as *C. myristicaeformis* Nutt.), stated by Dode as undoubtedly belonging to this species, and upon which much of his description of the leaves seems to have been based, actually belongs to *C.*

*Palmeri* described below. The disposition of *C. Diguetii* must, however, be based on the type specimen. (It should be pointed out that the specimen of *Pringle 1963* referred by Sargent in *Sylva* 7: 146. 1895, to *C. myristicaeformis*, is true *C. myristicaeformis*. Dode erroneously cited — by references — *Pringle 10167* and *Pringle 1963* as the same.)

2. *Carya myristicaeformis* (Michx. f.) Nutt. ex Ell. Sketch Bot. S. Car. & Ga. 2: 628. 1824.

*Carya myristicaeformis* Nutt. Gen. No. Amer. Pl. 2: 222. 1818; *nomen nudum* (see discussion of name in Little, 1943).

Small or large tree; leaflets 7–9, rarely 11, all typically sessile or subsessile, usually not falcate; younger parts of twigs, rachises, and lower leaflet-surfaces densely brown- or gray-glandular-scaly (lepidote), the scales often touching each other, the lower surface of the leaflets usually lustrous brown or silvery white, typically glabrate; bud-scales valvate, brownish; terminal buds about 7 mm. long, broadly ovate, not flattened; bud-scale scars narrow, crowded, forming a ciliate ring, though this is not always distinct; staminate catkins with a definite common peduncle located only at the base of strong new leafy growth; fruit densely brown-scaly, 4-wing-valved to base, the husk thin; nut oval, cylindrical, medium brown, mottled, not angled, with very thick shell, the secondary septa so low that they appear absent, so nut 2-celled except at the extreme base where it is 4-celled; lacunae in the nut-shell essentially absent.

VERNACULAR NAME: *Nutmeg hickory* (in the U. S. A.).

NUEVO LEON: Monterrey: *C. H. & M. T. Muller 64* fr. (AA, CM, Mex); *C. H. Muller 2655* fr. (BPI, GH); *C. G. Pringle 1963* fr. (AA, CM, GH, MO, NY, US). — Santiago, Horsetail Falls, *V. H. Chase 7802* fr. (BPI, CM, GH, MO, NY). — 15 mi. SW. of Galeana, *C. H. & M. T. Muller 1142* fr. (AA, CM, Mich, NY, US, Mex). — El Cercado, 30 mi. S. of Monterrey, *C. H. & M. T. Muller 1352* fr. (AA, CM, Mich, Mex). — Hacienda Vista Hermosa, 35 mi. S. of Monterrey, alt. 2350 ft., *S. S. White 1629* fr. (GH, Mich).

Martinez (1928) does not seem to report it, but Standley (1920) and Martinez (1937) report it from Nuevo Leon. It has so far been reported from no other state. This species also occurs in southeastern United States.

The field notes for *Muller 2655* state: "Large shrub up to 15 ft. or small tree to 25 ft. Mature trunks with bark scaling like shagbark. A common constituent of the oak-hickory wood. Canon Diente."

3. *Carya Palmeri* \* sp. nov.

Shrub or medium-sized tree up to 1 × 40 feet; larger leaves 23–37 cm. long, 15–28 cm. wide; leaflets 9–11, rarely 13, lanceolate to oblong- or ovate-lanceolate to rarely obovate, sessile, the lateral with rather broad

\* Foliolis 9–11, rariter 13, sessilibus, subtus dense aureo-glanduloso-lepidotis; gemmis aureis, perulis valvatis; fructibus 4-alatis, exocarpio tenue; nuce non variegata, subcompressa, putamine dissepimentisque tenuissimis, ad medium 4-loculato.

obtuse or even subcordate bases, occasionally falcate, finely serrate, strongly yellow-glandular-scaly beneath, the glands thick, leaflets greenish or more commonly appearing strongly yellowish brown beneath but not truly lustrous-sericeous as in *C. myristicaeformis*; uppermost lateral leaflets 9–20 cm. long, 2–6 cm. wide, the terminal leaflet only slightly larger; twigs, rachises, and lower leaflet-surfaces glabrate or commonly strongly pubescent; terminal bud 8–11 mm. long, slender, strongly flattened, all buds bright yellow because of dense yellow glands, glabrate to slightly puberulent at apex, frequently short-stalked, the bud-scales valvate, apparently only one or two pairs; bud-scale scars rather broad, the pairs separated, not forming a ring; staminate catkins about 8 cm. long on new growth at base of elongate leafy shoots or on special short leafless shoots from old wood, the common peduncle of the cluster short, 4–8 or even to 12 mm. long; bract of the flower slender, longer than the bracteoles; fruit frequently with a short stipe, 3–4 cm. long, 2–3 cm. thick, strongly 4-ridged to the very base, usually winged along the sutures to the base, strongly yellow-scaly, the husk very thin, 0.5–1 mm. thick, final dehiscence uncertain; nut gray-brown, not mottled, not angled, only slightly flattened, about 2.4 cm. thick parallel to the primary partition, the shell very thin (about 1 mm. thick), cavity for embryo very large, the secondary septa strongly developed to about the middle of the nut, so nut 4-celled to about the middle, primary septa and secondary internal ribs with strong brown-filled lacunae; endosperm ruminating, hence seed probably bitter. This species belongs to section APOCARYA.

NUEVO LEON: Monterrey, Sierra Madre, alt. 2600 ft., *C. G. Pringle 13957* fr. (GH, Mich, US). — Monterrey, Cañon Diente, *C. H. Muller 2643* fr. (BPI, GH). — Monterrey, Sierra Madre, alt. 2500–3000 ft., *C. G. Pringle 10167* stam. (GH, MO, NY, US, Mex, Paris). — Monterrey, Sierra Madre, *C. G. Pringle 13200* fr. (TYPE GH; CM, US, Mex), Sept. 7, 1904. — Municipio de Villa Santiago, Cañon Guajuco, Rancho Vista Hermosa, abundant in upper oak-hickory forest, *C. H. Muller 2034* im. fr. (AA, CM, Mich, Mex). — Villa de Santiago, Horsetail Falls, alt. 2500 ft., *Mr. & Mrs. W. C. Leavenworth 811* (CM, MO).

The species is named after Mr. Ernest J. Palmer, one of the foremost students of *Carya*, a friend of the writer, and for many years collector and research assistant at the Arnold Arboretum, Harvard University.

Most of the specimens were originally called *C. myristicaeformis*, because of the strong yellow color of the lower surface of the leaflets. *Carya Palmeri* differs from *C. myristicaeformis* in its bright yellow buds, the yellow-brown color of the lower leaflet-surfaces, and especially in the external and internal structure of the nut. It differs in these same respects from *C. illinoensis*, and in addition in the sessile leaflets. The species is very closely allied to *C. cordiformis* in that the buds, sessile leaflets, and internal structure of the nut are essentially identical. *Carya Palmeri* differs in having: (1) the fruit 4-winged-valved to the base instead of to the middle; (2) 9–13 instead of 7–9 (rarely to 11) leaflets; (3) more frequently hairy rachises and twigs; (4) strongly yellow fruit and lower

leaflet surface; (5) the leaflets more frequently falcate; (6) a stipe to the fruit; and (7) a longer staminate floral bract.

There are two different groups of specimens representing the species, one with strikingly yellow or yellowish brown lower surfaces of the leaflets (*Pringle 13957, Pringle 13200, Muller 2034*) and one with leaflets somewhat greener beneath (*Muller 2643, Leavenworth 811, Pringle 10167*). This second group is closer to *C. cordiformis* in its leaves, and it suggests the possibility that *C. Palmeri* might be a hybrid between *C. cordiformis* and either *C. illinoensis* or *C. myristicaeformis*. Certain features, however, are not intermediate. In each group mentioned above the leaflets and rachises may be glabrate or strongly pubescent, and the leaflets may be narrow and small, or broader and larger. In *Pringle 13200* and *Muller 2034* the uppermost lateral leaflets are 9–11 cm. long and 2–3.5 cm. wide, the leaves up to 23 cm. long and 15–20 cm. wide; in *Leavenworth 811* the leaflets are 15–20 cm. long and 5–6 cm. (terminal 6.5 cm.) wide, the leaves 28–37 cm. long and 22–28 cm. wide.

4. *Carya ovata* (Mill.) K. Koch var. *mexicana* (Engelm.) comb. nov.

*Carya mexicana* Engelm. ex W. B. Hemsley, Biol. Cent. Amer. Bot. 3: 162. 1883.

Tree, 15 to 20 meters high; leaflets 5, mostly obovate, sometimes oblanceolate, at least the terminal one strongly stalked, each serration with one or two dense subapical tufts of hairs, the serrations slender appressed to short, divergent and stout; rachis, twigs, and lower surface of leaflets glabrate to pubescent; buds brown, the terminal ones 9–15 mm. long, the scales overlapping, the outer persistent in winter; bud-scale scars crowded into a narrow usually hairy ring; staminate catkins at the base of long leafy shoots, the common peduncle elongate; fruit subglobose to oval, with a comparatively thin husk (3–6.5 mm. or even 1.5–3 mm. thick), 4-valved to the base, brown, not notably glandular nor winged; nut flattened, slightly to strongly 4-angled, whitish to whitish brown; secondary partition high, sometimes thick, the ends of the primary septa frequently much thickened, without lacunae.

VERNACULAR NAMES: *Nogalillo de San Luis Potosi; nogal motudo; nogal Rayado.*

NUEVO LEON: Sierra Madre Oriental: Puerto Blanco to Tarey, 15 miles SW. of Galeana, *C. H. & M. T. Muller 1226* fr. (AA, CM, Mich, NY, Tex, US, Mex). — El Cercado, 30 miles S. of Monterrey, *Muller 1355* (AA, CM, Mich, Tex). SAN LUIS POTOSI: Alvarez, *C. C. Parry & E. Palmer 835 1/2 pro parte* (see under *C. illinoensis* for other 835 1/2), type of *C. mexicana* at Kew not seen by the writer, but the following three isotypes seen: lf., fr. MO, lf. only GH, fr. only AA. — *Parry & Palmer 834 1/2* (GH). — *E. Palmer 71* fr. (AA, BPI, GH, CM, MO, NY, US, Mex). — *Goodman 1910, 1916*, fr. only (AA). TAMAULIPAS: San Jose, *H. H. Bartlett 10253* (CM, GH, US). — Cerro Barril, *Bartlett 10488* (US); *Bartlett 10490* fr. (US). — Cerro Zamora, El Milagro, *Bartlett 11080* fr. (CM, GH, US). — La Jolla Ranch, So. Victoria, *R. Runyan 1019* stam. (AA, US). QUERETARO: Pinal de Amoles (Armales?), *E. W. Nelson & E. A. Goldman 3934* (GH,

US). HIDALGO: near Chapatla, below Alumbres, not far from Zacualtipan, alt. 6500 ft., *A. J. Sharp* 46207 (Tenn, WEM). PUEBLO: slopes above Rio Necaco, toward Huauchinango, alt. 4700 ft., *A. J. Sharp* 45377 (Tenn, WEM). — "Parco," *Nicolas* in 1909 (CM).

Both Martinez (1937) and Standley (1920) report the *Mexican shag-bark* from San Luis Potosi and Queretaro. In addition to these states, collections have been made from Nuevo Leon, Tamaulipas, Pueblo, and Hidalgo. *Carya ovata*, called *shag-bark* or *shell-bark hickory* occurs in the eastern United States, extending from southern Maine to as far south as Texas.

This species was separated from *C. ovata* by Engelmann by its smaller buds, its more pubescent leaves, and its closer, more appressed serratures on the leaflets. The buds on the type, it is true, are somewhat shorter than those found in characteristic *C. ovata*, but they may represent axillary buds on fruiting twigs or terminal buds at the tips of short twigs. As pointed out by Rehder (1935), the buds on some specimens are 15 mm. long. The serrations are appressed on the type, but on many other specimens the serrations are short, divergent and broad as characteristic in *C. ovata*; furthermore some specimens of *C. ovata* from the northwestern portion of its range in the United States have slender appressed serrations.

Rehder (1935) pointed out that he saw no character distinguishing *C. mexicana* from *C. ovata*. According to the view of the writer the Mexican trees are difficult to separate even as a variety, but on certain trees the nut shell or the partitions are quite thick, the nut shell is often only slightly angled, and the husk may be quite thin (not on the type). Consequently in the aggregate these trees, all certainly very closely related, may be considered a geographical variety. Many of these features may, however, be found separately on individual trees of characteristic *C. ovata* in the United States, as far north as Massachusetts.

Rehder's *C. mexicana* forma *polyneura* should be transferred to this new variety.

4a. *Carya ovata* (Mill.) K. Koch var. *mexicana* (Engelmann) Manning  
forma *polyneura* (Rehder) comb. nov.

*Carya mexicana* Engelm. forma *polyneura* Rehder, Jour. Arnold Arb. 16:  
448, 1935.

This form (*C. H. & M. T. Muller* 1226, type at AA; and *Muller* 1355) appears different at first glance, but is probably a mere ecological form, possibly a variation occurring on certain parts of a tree. In the leaflets the veins are closer and more conspicuous. More field study is necessary. It is interesting that in its glabrous twigs and leaflets and dark buds this form approaches *C. carolinae-septentrionalis* (Ashe) Engl. & Graebn., the weak North Carolina segregate of *C. ovata*.

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